

Claims

1. Bone fixation means (1) comprising

- A) a longitudinal shaft (2) with the longitudinal axis (3) and
- B) an anchoring element (4) with the identical longitudinal axis (3), which can be fastened axially to the shaft (2) and fixed in a bone,  
characterized in that
- C) interacting means (5; 6) are provided at the shaft (2) and at the anchoring element (4) and alternatively permit or block rotation of the anchoring element (4) about the longitudinal axis (3) relative to the shaft (2).

2. The bone fixation means (1) of claim 1, characterized in that axial locking-in-position means (12) are disposed at the shaft (2) and at the anchoring element (4), by means of which the shaft (2) and the anchoring element (4) are held together axially.

3. The bone fixation means (1) of claim 2, characterized in that the axial locking-in-position means (12) and the interacting means (5; 6) are constructed independently of one another.

4. The bone fixation means (1) of claims 2 or 3, characterized in that the shaft (2) and the anchoring element (4) are firmly connected with one another axially.

5. The bone fixation means (1) of claims 2 or 3, characterized in that the shaft (2) and the anchoring element (4) can be detached from one another axially.

6. The bone fixation means (1) of one of the claims 2 to 5, characterized in that the axial locking-in-position means (12) between the anchoring element (4) and the shaft (2) are configured so that they can be snapped elastically into one another.

7. The bone fixation means (1) of claim 6, characterized in that the axial locking-in-position means (12) comprise radial, elastic blades (13) with elevations (14) and that the elevations (14) can be snapped into a complementary, circular groove (15), which is concentric with the longitudinal axis (3).

8. The bone fixation means (1) of claim 7, characterized in that the blades (13) are disposed at the anchoring element (4) and that the groove (15) is disposed at the shaft (2).

9. The bone fixation means (1) of claim 8, characterized in that the elevations (14) are constructed convex.

10. The bone fixation means (1) of claims 8 or 9, characterized in that the grooves (15) have a V-shaped cross section.

11. The bone fixation means (1) of one of the claims 2 to 4, characterized in that the axial locking-in-position means (12) comprise at least one locking-in-position pin (21), which is fixed transversely to the longitudinal axis (3) and the tip of which engages a circular groove (22), which is concentric with the longitudinal axis (3).

12. The bone fixation means (1) of one of the claims 2 to 4, characterized in that the axial locking-in-position means (12) comprise a retaining ring (44), which is clamped in a first annular groove (50) at the shaft (2), which is concentric with the longitudinal axis (3), and in a second annular groove (60) at the anchoring element (4), which is also concentric with the longitudinal axis (3).

13. The bone fixation means (1) of one of the claims 1 to 12, characterized in that the interacting means (5; 6) make possible a frictional connection between the shaft (2) and the anchoring element (4).

14. The bone fixation means (1) of claim 13, characterized in that the means (5; 6) comprises an inner conical segment (19; 20), which is disposed coaxially with the longitudinal axis (3) at the place connecting the shaft (2) and the anchoring element (4), and a conical element (16), which can be wedged axially detachably therein.

15. The bone fixation means (1) of claim 14, characterized in that a first conical segment (19) is provided in the shaft (2) and, corresponding thereto, a second conical segment (20) is provided in the anchoring element (4).

16. The bone fixation means (1) of one of the claims 1 to 13, characterized in that the interacting means (5; 6) comprise radially elastic blades (13), which are disposed at the anchoring element (4) and can be pressed by means of a conical locking screw (73) against the wall of the central borehole (18) in the shaft (2).

17. The bone fixation means (1) of claim 16, characterized in that the radially elastic blades (13) comprise elevations (14) and that the elevations (14) can be snapped into a complementary circular groove (15), which is concentric with the longitudinal axis (3).

18. The bone fixation means (1) of one of the claims 1 to 12, characterized in that the means (5; 6) make possible a rotationally positive connection between the shaft (2) and the anchoring element (4).

19. The bone fixation means (1) of claim 18, characterized in that the rotational positive connection is formed by a first and a second denticulation (23; 24), which can be brought into engagement with one another.

20. The bone fixation means (1) of claim 19, characterized in  
a) that the anchoring element (4) comprises a first denticulation (23), which is disposed at its fixed end (10), which is directed at against the shaft (2), and

b) that a rotationally locked-in-position, axially displaceable fixation element (56) with a second denticulation (24), which can be brought into engagement with the first denticulation (23), is disposed at the shaft (2).

21. The bone fixation means (1) of claim 19, characterized in  
c) that the anchoring element (4) comprises a rotationally locked-in-position, axially displaceable fixation element (56) with a first denticulation (23) and  
d) that a second denticulation (24), which can be brought into engagement with the first denticulation (23), is disposed at the shaft (2).

22. The bone fixation means (1) of claims 20 or 21, characterized in that the fixation element (56) can be shifted axially by means of a screw (29), which is disposed coaxially.

23. The bone fixation means (1) of one of the claims 1 to 22, characterized in that the anchoring element (4) includes helical blades with a pitch of G.

24. The bone fixation means (1) of claim 23, characterized in that the pitch G is larger than 50 mm and preferably larger than 80 mm.

25. The bone fixation means (1) of one of the claims 1 to 24, characterized in that the shaft (2) has an out-of-round cross section.

26. Fixation device for the osteosynthesis with a bone fixation means (1) of one of the claims 1 to 25, characterized in that it comprises a bone plate (45), which can be fastened to a femur (48) and has an angularly adjoining sleeve (49), it being possible to accommodate the shaft (2) of the bone fixation means (1) in the sleeve (49).

27. The fixation device of claim 26, characterized in that the sleeve (49) has an out-of-round cross-section and that the shaft (2) has an out-of-round cross section corresponding thereto.